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Discovery of Near-Earth Asteroids by CCD Scanning . . . . . T. Gehrels

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After years of preparation and computer programming, fund raising for advanced CCD and computer equipment, and waiting for the delivery of a 2048 x 2048 CCD, in order to make finding near-Earth asteroids possible even with our old 91-cm Spacewatch Telescope . . . we now discover them! The Table shows the results to date. They are all such different objects, with peculiar orbits. With our new technique of CCD scanning we have entered the domain of discovery that was not possible before, namely of the smallest, the fastest and the closest near-Earth asteroids. 1991 BA has a diameter of 9 meters, moved 24°/d when it was discovered, near magnitude-per-pixel of V = 23.0, and it came to about 170,000 km from Earth when it passed closest, at 18 hours UT of 18 January 1991.

Spacewatch Discoveries, to date *

Identification	Perihelion distance (AU)	Aphelion distance (AU)	Incli-nation (deg)	Dia-meter (km)	Date of Discovery	Remarks
1989 UP	0.98	2.7	3.9	0.3	27 Oct., 1989	elongated; perihelion at Earth orbit
1990 SS	0.89	2.5	19.4	0.9	25 Sep., 1990	
1990 TG1	0.77	4.2	9.1	4.6	14 Oct., 1990	
1990 UN	0.81	2.6	3.7	0.09	22 Oct., 1990	H=23.5
1990 UO	0.30	2.2	29.3	0.4	22 Oct., 1990	perihelion at Mercury orbit
1990 UP	1.10	1.5	28.1	0.4	24 Oct., 1990	Amor; slow rotation
1990 VA	0.71	1.3	14.2	0.6	9 Nov., 1990	Aten; perihelion at Venus orbit
1991 AM	0.51	2.8	29.7	2.3	14 Jan., 1991	crosses Venus orbit
1991 BA	0.71	3.8	2.0	0.009	18 Jan., 1991	smallest object found so far
1991 BN	0.87	2.0	3.4	0.5	19 Jan., 1991	
1991 CB1	0.64	2.7	15.8	1.3	15 Feb., 1991	Discovered at 2.54 AU from Sun
1991 EE	0.85	3.7	9.8	1.5	13 Mar., 1991	
1991 FA	1.08	3.0	3.2	1.5	17 Mar., 1991	Amor
1991 FE	1.08	3.5	8.6	5.8	18 Mar., 1991	Amor

*Automatic operation began in September 1990. We "rediscovered" 1990 UP (twice), (1865) Cerberus, P/Kopff, P/Taylor, P/Helin-Roman-Alu 2, and P/Hartley 1. We followed a few asteroids that turned out to be in the main belt after all, while one was a geosynchronous object.